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(54) **A hinge for constraining a door to a support structure of the door**

Scharnier zum Halten einer Tür an einer Tragstruktur

Charnière pour mettre en contrainte une porte contre une structure de support

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## Description

The invention relates to a hinge for constraining a door to a support structure.

In particular, the invention concerns a hinge which can be used to constrain the doors of electrical domestic appliances such as ovens, to the support structure of the appliances.

For simplicity, in the following description reference will be made to an oven, but this should not be taken as a limitation on the use of the invention.

Hinges of this type are usually constituted by two distinct and stably and kinematically connectable parts. Each part comprises a box structure having a more or less vertical development. The two box structures are rigidly fixable to the support structure, which in this case is the oven itself, and to the door near to its lower edge so that the door is tiltingly openable.

A lever is pivoted to the part of the hinge solid to the door, more specifically to the box structure constituting it. The pivot about which the lever is hinged to the box structure coincides with the rotation axis between the door and the oven structure.

The lever is removably constrainable to the lower end of a longitudinal slot made in the other part of the hinge, that is in the other box structure which is fixed to the oven.

The end of the lever exiting from the box structure it is pivoted to is destined to be rigidly associated with the other box support structure, fixed to the oven, and it exits from a respective longitudinal slot in the box structure itself. As mentioned above, for greater functionality the lever is arranged close to an end of the box structure to which it is pivoted, and the extreme transversal edges of the slot act as end-run stops for the lever. The longitudinal wall of the box structure comprising the slot acts as an end-run stop for the lever in its closed-door configuration, and the nearby transversal wall, which usually delimits the slot, acts as an end-run stop for the lever in its open-door configuration.

Elastic means act on the lever, interposed between the lever and the box structure of the part of hinge associated to the door. More precisely, the elastic means operate between the box structure and a rod internal to it. The rod is free to move along the box structure containing it and is pivoted at its free end, that is with its end that does not interact with the elastic means, to the lever. The fulcrum between the rod and the lever is situated in a zone of the lever which is interposed between the fulcrum of the lever and the box structure containing it and its end which is constrained to the other box structure, fixed to the door.

During the rotation of the door about the above-mentioned fulcrum, the elastic means contrast both the first distancing of the door from the oven structure, and the successive rotation of door and its consequent lowering into a totally-open-door configuration. Thus, this type of hinge continually exerts a force on the door which

tends to keep them in their closed-door configuration.

Therefore, when a door equipped with this type of hinge is opened, a certain force must be exerted to cause the first distancing of the door from the oven (rotating it about the said fulcrum), after which first exertion gradually less force is needed to complete the opening operation and end up in an totally-open-door configuration where an equilibrium situation is arrived at between the couple exerted by the weight of the door itself and the couple exerted by the elastic means, rendering the configuration stable.

As the door rotates about its rotation axis, the force exerted to allow its complete opening diminishes, since at the same time the couple given by the weight force increases. The resultant weight force of the door acts, about the rotation axis, with increasing arms. This means that a decreasing force must be exerted by the operator in order to overcome the reaction of the elastic means and arrive at a fully open door.

When, on the contrary, the door is closed, the force exerted on it gradually diminishes since the difference between the couple generated by the weight and the couple exerted on the door by the spring works in favour of the latter, up until a certain position where the door is almost closed: here it is necessary to exert a certain antagonistic force in the open-door direction rather than in the closed-door direction, so that the door does not hit violently against the oven.

The hinge conformation and the arrangement and calibration of the elastic means are such as to permit of considerable reaction to the opening of the totally-closed door since they have to guarantee the total closure of the door during use of the oven at all temperatures, when considerable pressures are created inside.

It is evident that, in this way, the closure or opening of the door are inconvenient and can lead to a violent closure of the door itself.

Further, the fact that the elastic means tend to keep the door in its closed configuration inevitably leads to the fact that when it is desired to open the door one must act manually on the door with a certain force in order to bring it into the desired position. This operation is not usually too difficult to carry out, but it can be inconvenient where the person using the oven has one or even two hands occupied, for example by the foods which must be replaced in the oven. Another type of hinge is proposed in the European Patent EP 0014114, which presents the features of the preamble of independent claims 1 and 2. In this case it is obtained a third ajar position of the door of the domestic appliance by means of a return spring that permanently biases the door to an intermediate position. The spring is connected at one end to the door and at the other end to a lever that is pivotally connected at the chassis of domestic appliance. When the door is manually or automatically released, the spring that was initially stretched, moves the door to the ajar position. In this position the spring has the minimum length and therefore the door is in a stable

position.

The aim of the present invention is therefore to provide a hinge of the above-mentioned type able to permit a first door-opening which is practically automatic with a subsequent opening on the application of a force that gradually diminishes up until it reaches a condition of substantial equilibrium with the couple exerted on the door by its own weight, which, in the meantime, is economical and easy to make and mount.

The invention resolves the problem of constraining a door to a support structure by providing a hinged comprising:

- a door and a corresponding support structure,
- a hinge for constraining the door to the support structure comprising a first part which is fixable to the support structure and a second part fixable to the door of the support structure, the second part is kinematically and rotatably connected about a first horizontal axis, at a lower portion of the hinge located near to a lower edge of the said door, to a portion of the first part, in such a way as to be able to perform rotations in both directions with respect to the first axis between two extreme positions of completely open and completely closed,
- rapid blocking-unblocking means of the door in its extreme closed position provided between door and support structure,
- said hinge comprising elastic means acting between both said first and second parts and generating, in successive order and during the rotation of the door towards a totally-open position, following the deactivation of the said blocking-unblocking means, at least one first moment applied to the said second part and determining a first rotation of the second part about the first axis and thus distancing the door from the support structure, so as to produce a partial opening of the door, and subsequently at least one second moment, contrary to the first, which brakes any further possible rotation of the second part about the first axis due to the weight of the door.

A hinged unit according to the present invention is characterised respectively by the features of the characterising part of independent claims 1 and 2.

Further characteristics and advantages of the present invention will better emerge from the detailed description that follows, of a preferred but non-exclusive embodiment here illustrated in the form of a non-limiting example in the accompanying drawings, in which:

- figure 1 shows a perspective view of an oven equipped with a door constrained to it by two hinges according to the present invention;
- figure 2 shows a schematic frontal view, partially in section, of a first embodiment of one of the hinges of figure 1 in several different operative situations;

- figure 3 shows a schematic frontal view, partially in section, of a second preferred embodiment of one of the hinges of figure 1 in several different operative conditions;

- 5 - figure 4 shows in exploded view the hinge according to the embodiment of figure 3.

With reference to the figures, 1 denotes an oven, comprising a containing structure 2 at which front lower zone a door 3 is connected by means of two hinges 4 permitting the door's rotation in the two directions about a common horizontal hinge axis 5 (figures 2 and 3). The containing structure, hereinafter known as the support structure 2, supports the door 3 to the oven 1 (the fact an oven is used should not be considered a limiting condition, since the support structure could be of any type). In the description that follows, for the sake of simplicity the hinges 4 shall be considered in connection with an oven.

According to the drawings, in particular figures 2 and 3, the hinges 4 are located close to the lower horizontal edge 3' of the door 3 so that the door 3 can be opened by tilting.

In figures 2, 3 and 4, the hinge 4 is of the type made in two separate parts which are easily connectable to each other both kinematically and rigidly, as will emerge from the following description.

The two parts composing the hinge 4 comprise a first part 6 which is fixed to the support structure 2 and a second part 7 which is fixed to the door 3. The first part 6 comprises a first box structure 6' and the second a second box structure 7', a lever 8, a rod 9 and elastic means 10. The lever 8 is kinematically connected internally to the box structure at one of its ends and is easily and rapidly rigidly constainable to the first box structure 6', with its second end projecting from a vertical slot 11 in the box structure 7'.

In the embodiment illustrated in figures 2, 3 and 4, the rod 9 is arranged longitudinally internally to the box structure 7' and is kinematically connected, at one end and by means of a pivot 12 parallel to the lower edge 3' of the door 3, to an intermediate point in the lever 8. The elastic means 10 act on the other end of the rod 9 and preferably comprise a helix spring working by compression. The spring 10 is keyed on the rod 9 externally to the box structure 7', and is held between a plane 36 forming the top of the box structure 7' and a stop constituted for example by a first crossbar 13 inserted by force through a seat 37 made on the free upper end of the rod 9.

The hinges 4 are arranged with their respective hinge axes 5 horizontal and coinciding, and are normally applied at the lower portion of the door 3, which door 3 is then mobile between a horizontal position (open) and a vertical position (closed).

Figure 4 shows the rod 9 is made in two consecutive portions 15 and 16, the first 15 of which is hinged to the lever 8 and exhibits a wide U-shaped transversal sec-

tion. The second 16 is also U-shaped but has a narrow transversal section and will couple inside the U-section of the first portion 15. The first portion 15 has, at its end which couples with the other portion 16, a second crossbar 17 which is inserted by force along a seat 18 made in the end of the first portion 15 and which is hooked by a hook 42 equipping the second portion 16 to form a stable coupling. The second portion 16 projects from the box structure 7' through a correspondingly shaped hole 19 made on the same plane 36.

Concerning the rod 9 assembly, the second portion 16 is inserted into the spring 10, up until the spring 10 strikes against the first crossbar 13, and then the assembly is inserted into the corresponding hole 19 in the plane 36 of the box structure 7'; then, by compressing the spring 10, the second portion 16 is inserted into the wider portion 15 so that the seat 18 engages the second crossbar 17.

Figures 2 and 3 show that the lever 8 is pivoted directly at the box structure 7' by means of the pivot 12, and the rod 9 is hinged directly to the lever 8 by a pivot 20 parallel to the other pivot 12. The pivot 20 and the pivot 12 do not move during the door 3 rotation and therefore also during the rotation of the second part 7 of the hinge 4 with respect to the lever 8, which is associated to the first box structure 6' by means of a seating 8' which strikes an internal stop 14 of the structure 6' and with its free end a pin 35, both the internal stop 14 and the pin 35 being arranged on the first box structure 6'. During the rotation of the door 3 in both directions, between one extreme closed position of the support structure 2 and an extreme open position, the second box structure 7' rotates about a first axis 5 of the pivot 12 while the rod 9 rotates about a second axis 24 of the pivot 20. The axis 5 is also the rotation axis of the second part 7 of the hinge 4 and thus also of the door 3 with respect to the support structure 2.

The second axis 24 and therefore the pivot 20 are above the first rotation axis 5 and are relatively fixed.

21 denotes, in figures 1, 2 and 3, a rapid door blocking-unblocking means in an open and closed configuration. The means 21, of known type and not further described, acts between the door 3 and the support structure 2 and after each manual closing of the door 3 keep the door 3 closed up until a manual action, that is, pushing a button 21', unblocks the door and it can be opened.

The hinge 4 in both the two preferred embodiments, illustrated in figures 2, 3 and 4, comprises the spring 10, which acts dynamically between the two parts 6 and 7 composing the hinge 4. Once the means 21 have been deactivated and the door 3 is free to move into its extreme positions by rotating about the first axis 5, the spring 10 generates at least a first moment which is applied to the second part 7 and which determines a first rotation of the said second part 7 about the first axis 5, distancing the door 3 from the said support structure 2 and thus partially opening it. Then the spring 10 generates at least a second moment, opposite in direction to

the first, to brake the further rotation of the door 3 which is made possible by its weight, in ways that will be more fully described hereinbelow.

In the embodiment of figure 2, the pivot 20 and the fulcrum axis 24 between the rod 9 and the lever 8 is arranged further away from the first part 6 with respect to the pivot 12 and thus the rotation axis 5. The axis 24 is arranged on the opposite side of the first box structure 6' to the first axis 5.

Now the functioning of the hinge will be described. To open the door 3, it is sufficient to act manually on the blocking-unblocking means 21 to eliminate any impediment to the door 3 opening. As soon as this is done, the hinges 4 determine a first rapid rotation of the door 3, about the said common hinge axis 5, and thus a progressive but slower opening, up until total open position is reached. The slowed opening occurs under the effect of the combined action of the weight of the door 3, which favours the opening movement, and a braking action exerted by the hinge 4 on the door 3. The elastic force which the spring 10 generates between the rod 9 and the box structure 7' acts according to a first resultant R1 passing along a direction indicated in figure 2, with D1 passing through the second axis 24. Thus the first rapid opening phase of the door 3 occurs since the pivot 20 and the axis 24 are arranged in the above-mentioned way with respect to the pivot 12, and the resultant R1 of the force exerted by the spring 10 on the pivot 12 through the rod 9 lies, at the extreme closed position of the door 3, externally to the first rotation axis 5 and is therefore such as to determine the application of a clockwise-direction first moment (denoted for clarity in figure 2 by M1) on the second box structure 7', producing the opening of the door 3. This moment persists up to when the hinges 4 reach the position indicated with 23 in figure 2, where the axes 5 and 24 of the pivots 12 and 20 are both intersected by the direction D1 and thus the resultant of the spring 10, having no arm with respect to the rotation axis 5, generates no moment. After this the opening of the door 3 continues under the weight of the door 3 itself, but the moment is inverted and is now anticlockwise, tending to slow down the opening of the door 3. After position 23 the resultant R1 passes inside the first rotation axis 5. The moment at this point is indicated in figure 2 by -M1.

It is well to specify that during the described functioning of the hinge 4, as the door 3 rotates starting from its position 23 towards its totally open position, a relative longitudinal motion is created between the rod 9 and the second box structure 7', made obligatory by the geometrical arrangement of the rod 9 and structure 7' and the fulcrum 5 and 24, which forces the spring 10 to compress and thus load. Further, as can be seen in figure 2, the arm of the first resultant R1 with respect to the first rotation axis 5 increases, and will increase in intensity up to moment M1.

In the hinge embodiment of figure 3, the elastic means 10 is split and comprises further springs 30.

In more detail, a lateral wall 26 of the second box structure 7' internally supports a tab 27, normal to it. The tab 27 is crossed by a hole 28 developing parallel to the longitudinal development direction of the box structure 7'. A stem 29 is housed axially slidable in the hole 28 and is coaxial to it. A helix spring 30 is wound about the stem 29 in a zone comprised between the tab 27 and the lever 8, which spring 30 is precompressed and exerts on the elements axially contrasting it a greater force than that exerted by the said spring 10. One end of the stem 29, adjacent to the lever 8, supports an idle roller 31 with a rotation axis parallel to the pivots 12 and 20. The idle roller 31, as will be described in more detail hereinbelow, when the door 3 is closed or just open (within a predetermined limit), rests against a cam 32 made on an upper edge 8" of the lever 8, while when the door 3 is open further than the said predetermined limit the idle roller 31 detaches from the lever 8. The idle roller 31 is supported idly by means of a pivot 40 crossing the portion of stem 29 end and with its opposite ends runs along a slot 41 made in the said second box structure 7'. The slot 41 limits the excursion of the said roller 31, as will be described hereinbelow.

The cam 32 is made on the upper edge 8" of the lever 8 and develops when the box structure 7' is in its closed configuration (see figure 3), incliningly towards the inside of the structure 7', towards the opening direction of the door 3. In hinge 4 the pivot 20 and therefore the second rotation axis 24 between the rod 9 and the lever 8 are arranged closer to the first part 6 with respect to the pivot 12 and therefore rotation axis 5. In particular, the axis 24 is arranged between the rotation axis 5 and the first box structure 6'. With this geometric position of the fulcra 5 and 24, the elastic force which the spring 10 generates between the rod 9 and the box structure 7' acts in accordance with a second resultant R2 which passes along a direction indicated in figure 3 with D2 passing through the second axis 24. Thus the second resultant R2 always lies, throughout the entire rotation of the door 3 between the two extreme positions, internally to the first rotation axis 5 and is therefore such as to determine the application of a second moment to the second box structure 7', indicated for clarity in figure 3 with M2, acting in an anticlockwise direction to force the door 3 into its position of closure.

The functioning of the hinge 4 is also in this case similar to the above-described, since after manually activating the blocking-unblocking means 21 so that there is no impediment to the door 3 opening, the hinge determines at first a small but relatively rapid rotation of the door 3 in the opening direction, about the said common hinge axis 5, and then a slower progressive opening action, up until total opening is achieved. The initial phase of rapid opening occurs thanks to the prevalence of the force exerted by the spring 30 with respect to that exerted by the spring 10 on the elements that contrast the ends, and finishes when the roller 31 detaches from the cam 32 of the lever 8, that is, when the position in-

dicated by 33 in figure 3 is reached.

More in detail, the spring 30 determines a third resultant R3 on the hinge 4 which generates a third moment M3, clockwise in direction, as indicated in figure 3, which when added to the moment generated by the second resultant R2 results in the first moment M1 applied to the second part 7 of the hinge 4. The slowed opening phase after the spring 30 has finished its action following the detachment of the roller 31 from the cam 32, occurs under the effect of the combined action of the weight of the door 3, which favours the opening, and a braking action exerted by the hinges 4' on the door 3 itself under the action of the respective springs 10. This braking action is due to the fact that, thanks to the described position of the pivots 12 and 20, the force exerted by the spring 10 on the pivot 12 through the rod 9 is such to determine the application of a moment to the box structure 7' having a direction that obstructs the opening of the door 3.

It is well to note that preferably and as shown in figure 2, in order that the hinge 4 is perfectly constrained to the support structure 2 it is preferable that the end portion of the lever 8 has, at the upper part of its end portion destined to be inserted into the first box structure 6', a slot 34 engagable by a fixed pivot 35 parallel to the pivots 12 and 20 and located internally to the first structure itself, and a vertical striker edge 48 interposed between the pivots 20 and 35 and turned towards the pivot 35 itself, able to rest, during the course of the connection of the door 3 to the oven 1, against the said internal stop 14 which, as can be seen in the figures, is constituted by a vertical projection connected to a lower edge of an entry slot 47 for the lever 8 into the support structure 2.

In this way, especially in the embodiment illustrated in figure 2 the lever 8 is stable in the position where it is anchored to the support structure 2, in both extreme door 3 configurations. The lever 8 is able in this way to react statically to both reactions that are created on it by effect of the two moments M1 and -M1.

The foregoing description shows how the hinges 4 fully attain the predetermined aims, since they are economical and simple to make, and are perfectly able to permit a substantially automatic opening of the said door 3.

## Claims

### 1. Hinged unit comprising:

- a door (3) and a corresponding support structure (2),
- a hinge for constraining the door (3) to the support structure (2) comprising a first part (6) which is fixable to the support structure (2) and a second part (7) fixable to the door (3) of the support structure (2), the second part (7) is kinematically and rotatably connected about a first

horizontal axis (5), at a lower portion of the hinge (4) located near to a lower edge (3') of the said door (3), to a portion of the first part (6), in such a way as to be able to perform rotations in both directions with respect to the first axis (5) between two extreme positions of completely open and completely closed,

- rapid blocking-unblocking means (21) of the door (3) in its extreme closed position provided between door (3) and support structure (2),
- said hinge (4) further comprising elastic means (10) acting between both said first (6) and second parts (7) and generating, in successive order and during a rotation of the door (3) towards a totally-open position, following a deactivation of the said blocking-unblocking means (21), at least one first moment applied to the said second part (7) and determining a first rotation of the second part (7) about the first axis (5) thus distancing the door (3) from the support structure (2), so as to produce a partial opening of the door (3), and subsequently at least one second moment, contrary to the first, which brakes any further possible rotation of the second part (7) about the first axis (5) due to the door (3) weight,

characterised in that,

the said first part (6) comprises a first box structure (6') fixable to the said support structure (2) and the second part (7) comprises a second box structure (7') fixable to the door (3) and pivoted, at a lower portion of the said, second box structure (7') and about the first axis (5) to an end of a lever (8) projecting with another end from the said second box structure (7') and rigidly but removably associated to the first box structure (6'), and a rod (9) arranged longitudinally and at least partially internally to the second box structure (7') with ability to slide with respect to the box structure (7') in a longitudinal direction; the rod (9) being kinematically rotatably connected at one of its ends at a second horizontal axis (24) of the lever (8), the second axis (24) being arranged above the first rotation axis (5) and in a fixed position relative to it; the said elastic means comprising a spring (10) acting between the rod (9) and the second box structure (7') in accordance with a first resultant (R1) passing through the second axis (24), said second axis (24) is arranged on an opposite side to the first box structure (6') with respect to the first axis (5); the first resultant (R1) lying, at the extreme closed position of the door (3), externally to the first rotation axis (5) so as to generate the first moment, and at the position of total opening of the door (3), internally to the first rotation axis (5), passing through an intermediate position of partial opening of the door (3) and thus partial opening of the first box structure (6') in which the first resultant

(R1) conjoins the first and second rotation axes (5, 24) and generates zero moment.

## 2. Hinged unit comprising:

- a door and a corresponding support structure,
- a hinge for constraining the door to the support structure comprising a first part (6) which is fixable to the support structure (2) and a second part (7) fixable to the door (3) of the support structure (2), the second part (7) is kinematically and rotatably connected about a first horizontal axis (5), at a lower portion of the hinge (4) located near to a lower edge (3') of the said door (3), to a portion of the first part (6), in such a way as to be able to perform rotations in both directions with respect to the first axis (5) between two extreme positions of completely open and completely closed,
- rapid blocking-unblocking means (21) of the door (3) in its extreme closed position provided between door (3) and support structure (2),
- said hinge (4) further comprising elastic means (10) acting between both said first (6) and second parts (7) and generating, in successive order and during a rotation of the door (3) towards a totally-open position, following a deactivation of the said blocking-unblocking means (21), at least one first moment applied to the said second part (7) and determining a first rotation of the second part (7) about the first axis (5) thus distancing the door (3) from the support structure (2), so as to produce a partial opening of the door (3), and subsequently at least one second moment, contrary to the first, which brakes any further possible rotation of the second part (7) about the first axis (5) due to the door (3) weight,

characterised in that,

the first part (6) comprises a first box structure (6') fixable to the support structure (2) and the second part (7) comprises a second box structure (7') fixable to the door (3) and pivoted, at its lower portion and about the first axis (5), to an end of a lever (8) projecting with another end from the second box structure (7') and being rigidly but removably associated to the first box structure (6'), and a rod (9) arranged longitudinally and at least partially internally to the second box structure (7') with slidability with respect to the second box structure (7') in a longitudinal direction; the rod (9) being kinematically and rotatably connected with one end about a second horizontal axis (24) to the lever (8), the second axis (24) being arranged above the first rotation axis (5) and being in a fixed position relative to it; the said elastic means comprising a first spring (10) acting between the rod (9) and the second box

structure (7') in accordance with a second resultant (R2) passing through the second axis (24) and lying internally to the first rotation axis (5), and a second spring acting between the second box structure (7') and the lever (8) at least at the extreme closed position of the door (3) and determining a third resultant (R3) generating a third moment which, added to the moment generated by the second resultant (R2) creates the first moment applied to the second part (7) to determine a first rotation of the second part (7) about the first axis (5), distancing the door (3) from the support structure (2) and producing a partial opening of the door (3).

3. A hinged unit as in claim 2, characterised in that the second spring means are constituted by a helix spring (30) precompressed and keyed on to a stem (29) axially slidably supported by a portion of the said box structure (7'), the stem (29) exhibiting an end portion arranged in contact with a cam (32) made on a portion of the lever (8), and the said helix spring (30) exhibiting one of its ends in contrast with the box structure (7') and another of its ends in contact with the stem (29).
4. A hinged unit as in claim 3, characterised in that the contact between the stem (29) and the cam (32) occurs through an idle roller (31) supported by an end portion of the stem (29).
5. A hinged unit as in claim 4, characterised in that the roller (31) is supported idle by means of a pivot (40) crossing the end portion of the stem (29) which pivot (40) opposite ends run within a slot (41) made on the second box structure (7'), limiting the roller (31) excursion.
6. A hinged unit as in claim 3, characterised in that the cam (32) is made on the upper edge (8'') of the lever (8) and develops, when the second box structure (7') is in the position where the door (3) is closed, incliningly towards the inside of the box structure (7'') itself and towards the opening direction of the door (3).
7. A hinged unit as in claims 1 to 3, characterised in that the end portion of the lever (8) destined to be inserted in the first box structure (6') is superiorly equipped with a slot (34) engageable by a fixed pivot (35) parallel to the first and second rotation axis (5 and 24) and located internally to the first structure (6'), and a vertical striking edge (48) destined to strike, during a course of the blocking of the door (3) to the support structure (2), against an internal striker (14) constituted by the lower edge of an entry slot (47) of the lever into the first box structure (6').

## Patentansprüche

### 1. Scharniervorrichtung, enthaltend:

- eine Tür (3) und eine entsprechende Tragstruktur (2);
- ein Scharnier zum Halten der Tür (3) an der Tragstruktur (2), enthaltend ein erstes Element (6), welches an der Tragstruktur (2) zu befestigen ist, und ein zweites Element (7), zu befestigen an der Tür (3) der Tragstruktur (2), wobei das zweite Element (7) kinematisch und um eine erste horizontale Achse (5) drehbar mit einem unteren Abschnitt des Scharniers (4), angeordnet dicht an der unteren Kante (3') der genannten Tür (3), an einen Abschnitt des ersten Elementes (6) angeschlossen ist, und zwar auf solche Weise, dass es im Verhältnis zu der ersten Achse (5) Umdrehungen in beiden Richtungen zwischen zwei extremen Positionen, das heisst einer vollkommen offenen und einer vollkommen geschlossenen ausführen kann;
- Schnellblockier- und Freigabemittel (21) für die Tür (3) in ihrer extremen geschlossenen Position, vorgesehen zwischen der Tür (3) und der Tragstruktur (2);
- wobei das genannte Scharnier (4) weiter elastische Mittel (10) enthält, die zwischen dem genannten ersten (6) und zweiten Element (7) wirken und in aufeinanderfolgender Weise und während einer Umdrehung der Tür (3) in Richtung einer vollkommenen offenen Position und infolge einer Entaktivierung der genannten Blockier- und Freigabemittel (21) wenigstens ein erstes Moment erzeugen, angewandt an dem genannten zweiten Element (7) und eine erste Umdrehung des zweiten Elementes (7) um die erste Achse (5) bestimmend, wodurch die Tür (3) von der Tragstruktur (2) soweit entfernt wird, dass sich ein teilweises Öffnen der Tür (3) ergibt, und anschliessend wenigstens ein zweites und dem ersten entgegenstehendes Moment, welches jede weitere mögliche Umdrehung des zweiten Elementes (7) um die erste Achse (5) bremst, die auf das Gewicht der Tür (3) zurückzuführen ist,

### dadurch gekennzeichnet,

dass das genannte erste Element (6) eine erste Kastenstruktur (6') enthält, die an der genannten Tragstruktur (2) befestigt werden kann, und dass das genannte zweite Element (7) eine zweite Kastenstruktur (7') enthält, die an der Tür (3) befestigt wird und mit einem unteren Abschnitt der genannten zweiten Kastenstruktur (7') und um die erste Achse (5) an das Ende eines Hebels (8) angelenkt ist, der mit seinem anderen Ende aus der genannten zweiten Kastenstruktur (7') herausragt und fest, jedoch lösbar,

mit der ersten Kastenstruktur (6') verbunden wird, sowie eine Stange (9), angeordnet in längsverlaufender Weise und wenigstens zu einem Teil im Inneren der zweiten Kastenstruktur (7') mit der Fähigkeit, im Verhältnis zu der Kastenstruktur (7') in einer Längsrichtung zu gleiten; wobei die Stange (9) kinematisch drehbar mit einem ihrer Enden an eine zweite horizontale Achse (24) des Hebels (8) angeschlossen ist, wobei die zweite Achse (24) oberhalb der ersten Drehachse (5) und in einer festen Position im Verhältnis zu dieser angeordnet ist; und wobei die genannten elastischen Mittel eine Feder (10) enthalten, die in Übereinstimmung mit einer durch die zweite Achse (24) verlaufenden ersten Resultierenden (R1) zwischen der Stange (9) und der zweiten Kastenstruktur (7') wirkt, wobei die genannte zweite Achse (24) im Verhältnis zu der ersten Achse (5) an einer entgegengesetzten Seite zu der ersten Kastenstruktur (6') angeordnet ist; wobei die erste Resultierende (R1) während der extremen geschlossenen Position der Tür (3) ausserhalb der ersten Drehachse (5) liegt, so dass ein erstes Moment erzeugt wird, und während der vollkommen offenen Position der Tür (3) im Inneren der ersten Drehachse (5), in der sie durch eine Zwischenposition der teilweisen Öffnung der Tür (3) und somit der teilweisen Öffnung der ersten Kastenstruktur (6') verläuft, in welcher die erste Resultierende (R1) die erste und die zweite Drehachse (5, 25) miteinander verbindet und ein Null-Moment erzeugt.

## 2. Scharniervorrichtung, enthaltend:

- eine Tür (3) und eine entsprechende Tragstruktur (2);
- ein Scharnier zum Halten der Tür (3) an der Tragstruktur (2), enthaltend ein erstes Element (6), welches an der Tragstruktur (2) zu befestigen ist, und ein zweites Element (7), zu befestigen an der Tür (3) der Tragstruktur (2), wobei das zweite Element (7) kinematisch und um eine erste horizontale Achse (5) drehbar mit einem unteren Abschnitt des Scharniers (4), angeordnet dicht an der unteren Kante (3') der genannten Tür (3), an einen Abschnitt des ersten Elementes (6) angeschlossen ist, und zwar auf solche Weise, dass es im Verhältnis zu der ersten Achse (5) Umdrehungen in beiden Richtungen zwischen zwei extremen Positionen, das heisst einer vollkommen offenen und einer vollkommen geschlossenen ausführen kann;
- Schnellblockier- und Freigabemittel (21) für die Tür (3) in ihrer extremen geschlossenen Position, vorgesehen zwischen der Tür (3) und der Tragstruktur (2);
- das genannte Scharnier (4) enthält weiter elastische Mittel (10), die zwischen dem genannten ersten (6) und zweiten Element (7) wirken

und in aufeinanderfolgender Weise und während einer Umdrehung der Tür (3) in Richtung einer vollkommenen offenen Position und infolge einer Entaktivierung der genannten Blockier- und Freigabemittel (21) wenigstens ein erstes Moment erzeugen, angewandt an dem genannten zweiten Element (7) und eine erste Umdrehung des zweiten Elementes (7) um die erste Achse (5) bestimmen, wodurch die Tür (3) von der Tragstruktur (2) soweit entfernt wird, dass sich ein teilweises Öffnen der Tür (3) ergibt, und anschliessend wenigstens ein zweites und dem ersten entgegenstehendes Moment, welches jede weitere mögliche Umdrehung des zweiten Elementes (7) um die erste Achse (5) bremst, zurückzuführen auf das Gewicht der Tür (3),

## **dadurch gekennzeichnet,**

dass das genannte erste Element (6) eine erste Kastenstruktur (6') enthält, die an der genannten Tragstruktur (2) befestigt werden kann, und dass das genannte zweite Element (7) eine zweite Kastenstruktur (7') enthält, die an der Tür (3) befestigt wird und mit ihrem unteren Abschnitt und um die erste Achse (5) an das Ende eines Hebels (8) angelenkt ist, der mit seinem anderen Ende aus der genannten zweiten Kastenstruktur (7') herausragt und fest, jedoch lösbar, mit der ersten Kastenstruktur (6') verbunden ist, sowie eine Stange (9), angeordnet in längsverlaufender Weise und wenigstens zu einem Teil im Inneren der zweiten Kastenstruktur (7') mit der Fähigkeit, im Verhältnis zu der Kastenstruktur (7') in einer Längsrichtung zu gleiten; wobei die Stange (9) kinematisch drehbar mit einem ihrer Enden an eine zweite horizontale Achse (24) des Hebels (8) angeschlossen ist, wobei die zweite Achse (24) oberhalb der ersten Drehachse (5) und in einer festen Position im Verhältnis zu dieser angeordnet ist; und wobei die genannten elastischen Mittel eine Feder (10) enthalten, die in Übereinstimmung mit einer durch die zweite Achse (24) verlaufenden und im Inneren der ersten Drehachse (5) liegenden zweiten Resultierenden (R2) zwischen der Stange (9) und der zweiten Kastenstruktur (7') wirkt, und eine zweite Feder, die zwischen der zweiten Kastenstruktur (7') und dem Hebel (8) wenigstens in der extremen geschlossenen Position der Tür (3) wirkt und eine dritte Resultierende (R3) bestimmt, die ein drittes Moment erzeugt, welches, hinzugefügt zu dem von der zweiten Resultierenden (R2) erzeugten Moment, das erste Moment bildet, das auf das zweite Element (7) angewandt wird, um eine erste Umdrehung des zweiten Elementes (7) um die erste Achse (5) zu bewirken, wobei die Tür (3) von der Tragstruktur (2) entfernt und ein teilweises Öffnen der Tür (3) hervorgerufen wird.



3. Scharniervorrichtung nach Patentanspruch 2, **dadurch gekennzeichnet**, dass die zweiten Feder-  
mittel aus einer vorgespannten Schneckenfeder  
(30) gebildet sind, aufgezogen auf einen Schaft  
(29), der axial gleitbar von einem Teil der genannten  
Kastenstruktur (7') getragen wird, wobei der Schaft  
(29) einen Endabschnitt aufweist, der im Kontakt  
mit einer sich an einem Abschnitt des Hebels (8)  
befindlichen Nocke (32) angeordnet ist, und wobei  
die genannte Schneckenfeder (30) eines ihrer En-  
den im Kontrast zu der Kastenstruktur (7') und das  
andere der Enden im Kontakt mit dem Schaft (29)  
aufweist.
4. Scharniervorrichtung nach Patentanspruch 3, **da-  
durch gekennzeichnet**, dass der Kontakt zwi-  
schen dem Schaft (29) und der Nocke (32) über ei-  
ne leerlaufende Rolle (31) erfolgt, die von dem End-  
abschnitt des Schaftes (29) getragen wird.
5. Scharniervorrichtung nach Patentanspruch 4, **da-  
durch gekennzeichnet**, dass die Rolle (31) leer-  
laufend von einem Zapfen (40) getragen wird, der  
durch den Endabschnitt des Schaftes (29) durch-  
geführt ist, wobei die entgegengesetzten Enden  
des Zapfens (40) innerhalb eines Schlitzes (41) lau-  
fen, der in die zweite Kastenstruktur (7') eingearbei-  
tet ist, um den Ausschlag der Rolle (31) zu begren-  
zen.
6. Scharniervorrichtung nach Patentanspruch 3, **da-  
durch gekennzeichnet**, dass die Nocke (32) an die  
obere Kante (8") des Hebels (8) angearbeitet ist  
und, wenn die zweite Kastenstruktur (7') sich in der  
Position befindet, in welcher die Tür geschlossen  
ist, sich zur Innenseite der Kastenstruktur (7') selbst  
und zur Öffnungsrichtung der Tür (3) hin neigt.
7. Scharniervorrichtung nach den Patentansprüchen  
von 1 bis 3, **dadurch gekennzeichnet**, dass der  
Endabschnitt des Hebels (8), der dazu bestimmt ist,  
in die erste Kastenstruktur (6') eingefügt zu werden,  
oben mit einem Schlitz (34) versehen ist, in den ein  
feststehender Zapfen (35) eingreifen kann, der par-  
allel zu der ersten und der zweiten Drehachse (5,  
24) verläuft und im Inneren der ersten Kastenstruk-  
tur (6') angeordnet ist, sowie mit einer Anschlagkan-  
te (48), dazu bestimmt, während der Blockierung  
der Tür (3) an der Tragstruktur (2) auf einen internen  
Anschlag (14) zu treffen, der aus der unteren Kante  
eines Eintrittsschlitzes (47) für den Hebel in die er-  
ste Kastenstruktur (6') gebildet wird.

## Revendications

1. Une unité sur charnière comprenant :

- une porte (3) et une structure de support (2)  
correspondante,
- une charnière pour mettre en contrainte la porte  
(3) contre la structure de support (2), compre-  
nant une première partie (6), fixable à la struc-  
ture de support (2), et une deuxième partie (7)  
fixable à la porte (3) de la structure du support  
(2), la deuxième partie (7) étant reliée de façon  
cinématique et tournante à un premier axe ho-  
rizontal (5), à la hauteur d'une portion inférieure  
de la charnière (4) située près d'un bord infé-  
rieur (3') de ladite porte (3), à une portion de la  
première partie (6), de façon à pouvoir accom-  
plir des rotations dans les deux directions par  
rapport au premier axe (5) entre les deux posi-  
tions extrêmes, complètement ouverte et com-  
plètement fermée,
- des moyens de blocage-déblocage rapide (21)  
de la porte (3) dans sa position extrême fermée,  
situés entre la porte (3) et la structure de sup-  
port (2),
- ladite charnière (4) comprenant en outre des  
moyens élastiques (10) agissant entre lesdites  
première (6) et deuxième (7) parties, et géné-  
rant, en ordre successif et pendant la rotation  
de la porte (3) vers une position totalement  
ouverte, par suite de la désactivation dudit dis-  
positif de blocage-déblocage (21), au moins un  
premier moment appliqué à ladite deuxième  
partie (7) et déterminant une première rotation  
de la deuxième partie (7) sur le premier axe (5),  
éloignant de la sorte la porte (3) de la structure  
de support (2), de façon à produire une ouver-  
ture partielle de la porte (3), et subséquemment  
au moins un deuxième moment, contraire au  
premier, qui freine toute autre rotation possible  
de la deuxième partie (7) sur le premier axe (5)  
sous l'effet du poids de la porte (3),

caractérisée en ce que,

ladite première partie (6) comprend une première  
structure en forme de boîte (6') fixable à ladite struc-  
ture de support (2), et que la deuxième partie (7)  
comprend une deuxième structure en forme de boî-  
te (7') fixable à la porte (3) et pivotant, à la hauteur  
d'une portion inférieure de ladite deuxième structu-  
re en forme de boîte (7') et sur le premier axe (5),  
à l'extrémité d'un levier (8) dont l'autre extrémité dé-  
passe de ladite deuxième structure en forme de boî-  
te (7') et est associée de façon rigide mais amovible  
à la première structure en forme de boîte (6'), et une  
tige (9) disposée de façon longitudinale, et entrant  
au moins partiellement à l'intérieur de la deuxième  
structure en forme de boîte (7'), de façon à pouvoir  
coulisser par rapport à la structure en forme de boî-  
te (7') ; la tige (9) étant reliée de façon cinématique  
et tournante par l'une de ses extrémités à un  
deuxième axe horizontal (24) du levier (8), le

deuxième axe (24) étant disposé au-dessus du premier axe de rotation (5) et dans une position fixe par rapport à lui ; lesdits moyens élastiques comprenant un ressort (10) agissant entre la tige (9) et la deuxième structure en forme de boîte (7') suivant une première résultante (R1) passant par le deuxième axe (24), ledit deuxième axe (24) est disposé sur un côté opposé à la première structure en forme de boîte (6') par rapport au premier axe (5) ; la première résultante (R1) se trouvant, dans la position extrême fermée de la porte (3), à l'extérieur du premier axe de rotation (5), de façon à générer le premier moment, et, dans la position de fermeture totale de la porte (3), à l'intérieur du premier axe de rotation (5), passant par une position intermédiaire d'ouverture partielle de la porte (3) et, par conséquent, d'ouverture partielle de la première structure en forme de boîte (6'), dans laquelle la première résultante (R1) relie le premier et le deuxième axe de rotation (5, 24) et génère un moment de valeur nulle.

2. Une unité sur charnière comprenant :

- une porte et une structure de support correspondance,
- une charnière pour mettre en contrainte la porte contre la structure de support, comprenant une première partie (6), fixable à la structure de support (2), et une deuxième partie (7) fixable à la porte (3) de la structure du support (2), la deuxième partie (7) étant reliée de façon cinématique et tournante à un premier axe horizontal (5), à la hauteur d'une portion inférieure de la charnière (4) située près d'un bord inférieur (3') de ladite porte (3), à une portion de la première partie (6), de façon à pouvoir accomplir des rotations dans les deux directions par rapport au premier axe (5) entre les deux positions extrêmes, complètement ouverte et complètement fermée,
- des moyens de blocage-déblocage rapide (21) de la porte (3) dans sa position extrême fermée, situés entre la porte (3) et la structure de support (2),
- ladite charnière (4) comprenant en outre des moyens élastiques (10) agissant entre lesdites première (6) et deuxième (7) parties, et générant, en ordre successif et pendant la rotation de la porte (3) vers une position totalement ouverte, par suite de la désactivation dudit dispositif de blocage-déblocage (21), au moins un premier moment appliqué à ladite deuxième partie (7) et déterminant une première rotation de la deuxième partie (7) sur le premier axe (5), éloignant de la sorte la porte (3) de la structure de support (2), de façon à produire une ouverture partielle de la porte (3), et subséquemment

au moins un deuxième moment, contraire au premier, qui freine toute autre rotation possible de la deuxième partie (7) sur le premier axe (5) sous l'effet du poids de la porte (3),

caractérisée en ce que,

ladite première partie (6) comprend une première structure en forme de boîte (6') fixable à ladite structure de support (2), et que la deuxième partie (7) comprend une deuxième structure en forme de boîte (7') fixable à la porte (3) et pivotant, à la hauteur de sa portion inférieure et sur le premier axe (5), à l'extrémité d'un levier (8) dont l'autre extrémité dépasse de ladite deuxième structure en forme de boîte (7') et est associée de façon rigide mais amovible à la première structure en forme de boîte (6'), et une tige (9) disposée de façon longitudinale, et entrant au moins partiellement à l'intérieur de la deuxième structure en forme de boîte (7'), de façon à pouvoir coulisser par rapport à la structure en forme de boîte (7') ; la tige (9) étant reliée de façon cinématique et tournante par l'une de ses extrémités à un deuxième axe horizontal (24) du levier (8), le deuxième axe (24) étant disposé au-dessus du premier axe de rotation (5) et dans une position fixe par rapport à lui ; lesdits moyens élastiques comprenant un ressort (10) agissant entre la tige (9) et la deuxième structure en forme de boîte (7') suivant une deuxième résultante (R2) passant par le deuxième axe (24) et se trouvant à l'intérieur du premier axe de rotation (5), et un deuxième ressort agissant entre la deuxième structure en forme de boîte (7') et le levier (8) au moins dans la position extrême fermée de la porte, et déterminant une troisième résultante (R3), générant un troisième moment qui, ajouté au moment généré par la deuxième résultante (R2) crée le premier moment appliqué à la deuxième partie (7), pour déterminer une première rotation de la deuxième partie (7) sur le premier axe (5), éloignant la porte (3) de la structure de support (2), et produisant une ouverture partielle de la porte (3).

3. Une unité sur charnière selon la revendication 2, caractérisée en ce que les deuxièmes moyens élastiques sont constitués d'un ressort hélicoïdal (30) précomprimé et claveté sur une tige (29) coulisant de façon axiale supportée par une portion de ladite structure en forme de boîte (7'), la tige (29) présentant une portion finale en contact avec une came (32) faite sur une portion du levier (8), et ledit ressort hélicoïdal (30) présentant l'une de ses extrémités en butée contre la structure en forme de boîte (7') et l'autre extrémité en contact avec la tige (29).

4. Une unité sur charnière selon la revendication 3, caractérisée en ce que le contact entre la tige (29) et la came (32) se fait au moyen d'un rouleau fou sup-

porté par une portion finale de la tige (29).

5. Une unité sur charnière selon la revendication 4, caractérisée en ce que le rouleau (31) est supporté de façon folle au moyen d'un pivot (40) croisant la portion finale de la tige (29), les extrémités opposées de ce pivot (40) s'engageant dans une fente (41) pratiquée sur la deuxième structure en forme de boîte (7'), limitant le mouvement du rouleau (31). 5
6. Une unité sur charnière selon la revendication 3, caractérisée en ce que la came (32) est réalisée sur le bord supérieur (8") du levier (8) et se meut, quand la deuxième structure en forme de boîte (7') est dans la position dans laquelle la porte (3) est fermée, de façon inclinée vers l'intérieur de la structure en forme de boîte (7") elle-même et vers la direction d'ouverture de la porte (3). 10
7. Une unité sur charnière selon les revendications 1 et 3, caractérisée en ce que la portion finale du levier (8) destinée à être insérée dans la première structure en forme de boîte (6') est équipée dans sa partie supérieure d'une fente (34) dans laquelle peut s'engager un pivot fixe (35) parallèle au premier et au deuxième axe de rotation (5 et 24) et situé à l'intérieur de la première structure (6'), et un bord de percussion vertical (48) destiné à percuter, pendant la course de fermeture de la porte (3) vers la structure de support (2), contre un percuteur interne (14) constitué du bord inférieur d'une fente d'entrée (47) du levier à l'intérieur de la première structure en forme de boîte (6'). 15

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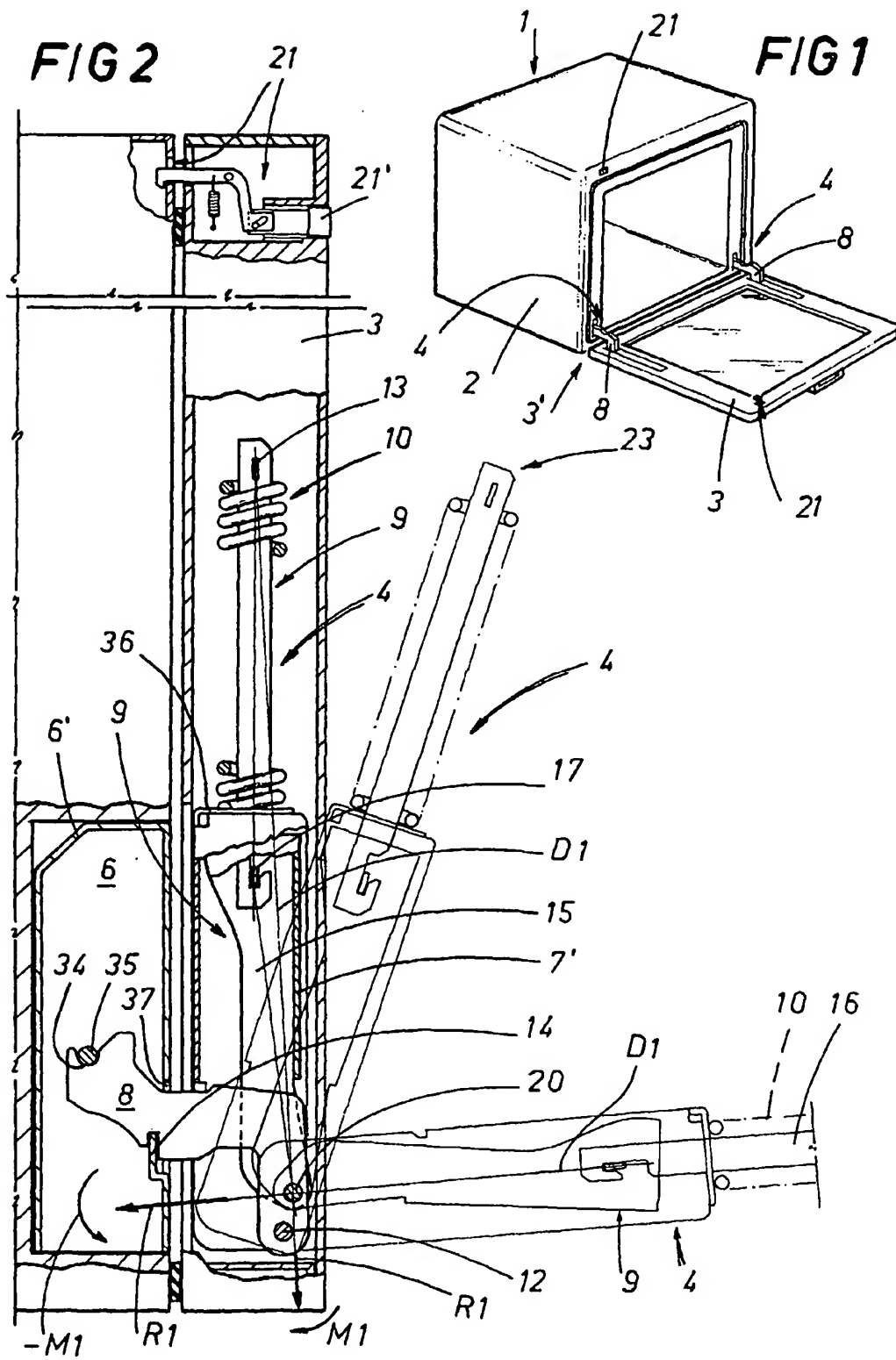
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**FIG 3**

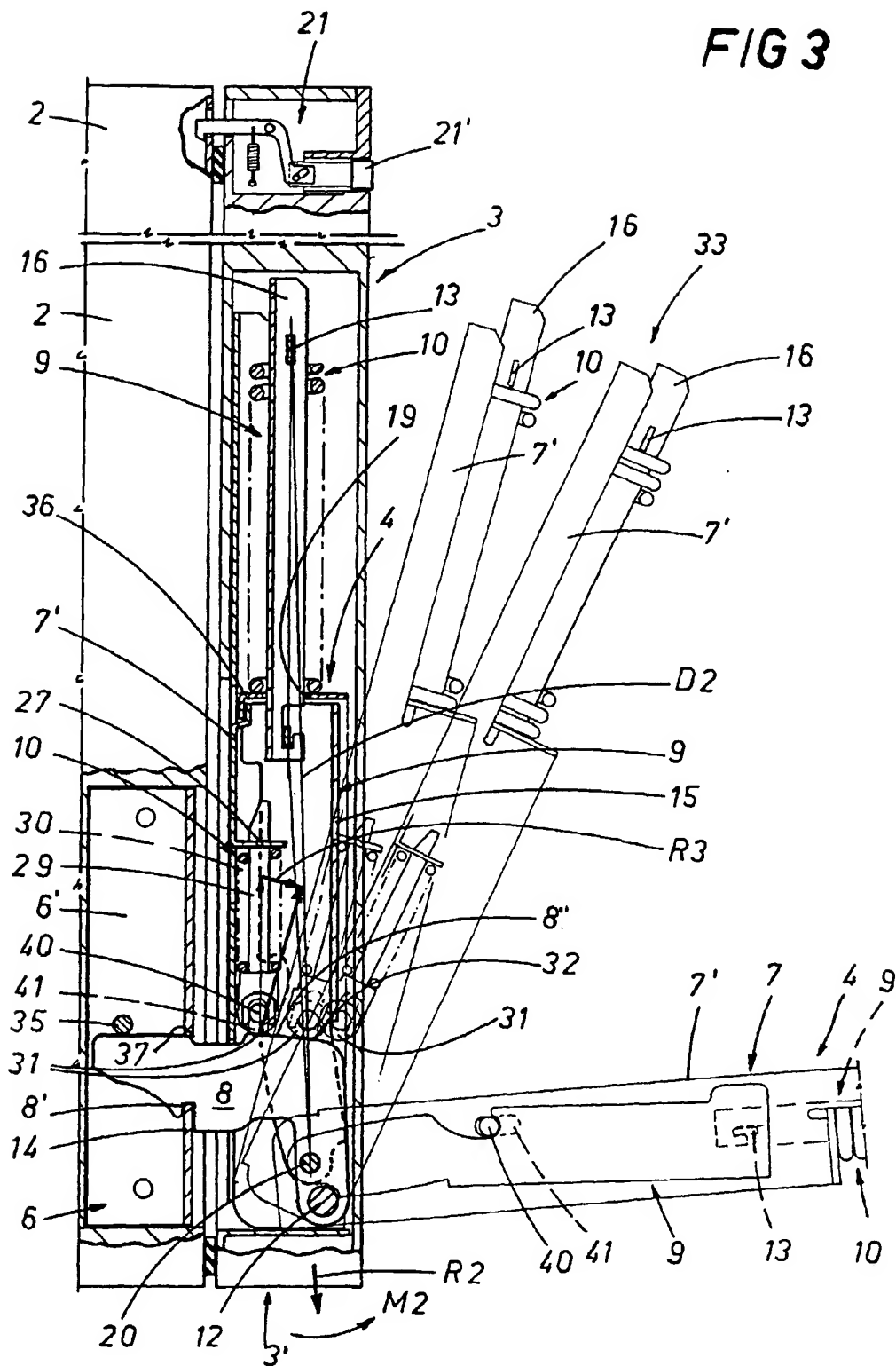


FIG 4

